H315298425US

UNITED STATES PATENT APPLICATION

OF

COLIN DUFFY

FOR

POWERED OSCILLATING HAND TOOL

FILED

APRIL 23, 1999

DOCKET NO. CS1055#SP

POWERED OSCILLATING HAND TOOL

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a powered oscillating hand tool, in particular a powered oscillating hand tool comprising a drive unit having an electric motor with a drive shaft to which a sander head can be attached.

Description of the Prior Art

In conventional sanders of the orbital type, with a shaped shoe, the drive system comprises an eccentric which is restrained so that the sander shoe cannot spin independently of the motor and it therefore describes a regular orbit. The shoes of such sanders are available in a range of shapes and such sanders are in general used for the removal of relatively small quantities of material, for example for detailed work or for finishing. The base of the shoe may be provided with a surface, in particular a hook and loop surface, on which an abrasive sheet may be mounted.

European Patent No 610 801 describes a sander which carries a triangular shoe which can be detached from the body of the sander by means of an operating button located at the front corner of the sander. The operating button carries a bolt which is resiliently mounted on the tool and is biased towards engagement under a catch hook provided in the triangular shoe. The sander is further provided, on the edge opposite the operating button, with at least one engagement opening for engaging at least one support claw provided on the triangular shoe.

It is a disadvantage of such an arrangement that it is expensive to manufacture and may be difficult to operate to attach and detach the shoe, in particular under the conditions in which the sander is likely to be used.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a sander in which the above disadvantages are reduced or substantially obviated.

The present invention therefore provides a powered oscillating hand tool comprising

(a) a drive unit having an electric motor and a drive shaft;

(b) a bearing eccentrically mounted on the drive shaft and located radially eccentrically relative to the drive shaft;

(c) a carrier plate mounted on the bearing and

(d) a platen for mounting on the carrier plate

characterised in that the carrier plate is provided with a first engagement means and the platen

2

is provided with second engagement means to engage with the first engagement means by rotation of the platen relative to the carrier plate.

The first and second engagement means preferably together form a bayonet fitting, more preferably a bayonet fitting of the type in which the first engagement means (provided on the carrier) is in the form of one or more apertures and the second engagement means is in the form of one or more hook members.

BRIEF DESSCRIPTION OF THE DRAWINGS

An embodiment of a powered oscillating hand tool according to the invention will now be described with reference to the accompanying drawings in which

Figure 1 is a side view, in section of a preferred embodiment of a powered oscillating hand tool according to the invention, with a platen attached;

Figure 2 is a perspective view of the carrier plate of Figure 1, viewed from above, and

Figure 3 is a perspective view of the platen of Figure 1, viewed from above.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 shows a sanding device (10) comprising a drive unit (2) including an electric motor (4) located in a housing (6) and a drive shaft (8). A fan (12) mounted on shaft (8) is arranged to draw air in from mouth (14) of a carrier plate (16) permanently mounted to the sanding device (10) and direct it through extractor duct (18) to exhaust outlet (20). Mounted on the drive shaft (8) is a counterbalance (24). The counterbalance (24) is necessary because mounted thereon is a bearing (26). The bearing (26) is eccentrically mounted relative to the drive shaft (8) and hence the need for the counterbalance (24). It will be readily appreciated by those skilled in the art that the counterbalance (24) has an excess of weight in the radial direction (relative to the axis of the drive shaft (8)) diametrically opposite to that of the radial direction in which the bearing (26) projects furthest away from the drive shaft (8).

Any suitable method of mounting the counterbalance (24) on the drive shaft (8) may be employed. In this example, a simple press-fit is used. The same method may be employed to mount the bearing (26) on the counterbalance (24).

In the example shown with reference to figure 1, the counterbalance (24) and the fan (12) are formed as a single unit around the drive shaft (8). This is simply for ease of manufacture. They could each be formed as separate units and individually mounted on the drive shaft (8).

The carrier plate (16) is mounted on the bearing (26) by any suitable means. In the present example, the carrier (16) is press-fitted into engagement with the bearing (16)

although it could equally well be secured by moulding or using a nut or the like.

Three flexible columns (28) made of rubber are arranged around the drive shaft (8). The upper end (30) of each of the flexible columns (28) is held in the housing (6) and the lower end (32) is located in a recess (34) provided in the carrier plate (16).

A platen (36) is detachably mounted on the carrier plate (16), as will be described in more detail with reference to Figures 2 and 3.

The carrier (16) is driven by the electric motor (4) through drive shaft (8). Rotation of the drive shaft (8) will cause the radially internal portion of the bearing (26) to rotate concomitantly. Because the radially external portion of the bearing (26) is in rigid contact with the carrier (16), then this particular portion does not rotate. Because the carrier (16) is restrained from free rotation by the flexible columns (28), then the carrier (16) will exhibit an orbital motion on rotation of the drive shaft (8). A perforated sandpaper sheet (not shown) may be attached to the outer face (38) of the platen (36), for example by the use of hook-and-loop fabric such as that sold as VELCRO® glued to face (38). Holes (40) passing through the platen (36) facilitate the removal of dust etc., from the sanding face through the platen (36) to exhaust outlet (20) via the duct (18). An extractor hose (not shown) may be attached to the exhaust outlet (20).

As can be seen from Figure 2, the carrier plate (16) is made from a plastics material, for example glass filled nylon and carries on its underside a plurality of strengthening ribs (not shown). The carrier plate (16) includes three recesses (34) which are used to couple the carrier plate (16) to the sanding device (10) by means of the flexible columns (28) which locate in the recesses (34) in known manner. The centre of the carrier plate (16) has a boss (42) which is used to mount the carrier plate on the bearing (26).

The carrier plate (16) has a plurality of holes (44) formed therein and spaced at 120° around the central boss (42). The holes (44) are formed so that each can accept one of a plurality of projections formed on the platen (36) which will be described in more detail below. The holes (44) are shaped so as to provide an area of relatively large cross sectional area which narrows down to a strip of narrow width. Flanking each hole (44) and extending substantially along the length from the relatively large cross-sectional area to the end of the relatively narrow strip is a further hole (46). These holes (46) narrower than holes 44 and are formed so as to allow the piece of plastics material (48) from which the carrier plate (16) is formed and which is situated between the holes (44) and (46) to act as a spring mechanism. The hole (44) is shaped so that an inwardly projecting piece (50) of the plastics material of

4

the carrier plate (16) is formed at the position shown and acts as a detent.

It will also be seen from Figure 2 that each hole (44) is associated with a vertically displaced platform (52) which projects inwardly opposite detent (50). Flat wall (58) extends vertically upward along one side of platform (52).

The platen (36) is provided with a plurality of projections (54) projecting from the inner face of the platen (36). In order to mount the platen (36) on the carrier plate (16) the platen (36) is oriented such that projections (54) are situated directly below each of the holes (44). The platen (36) is then urged toward the carrier plate (16) so that the projections (54) protrude through their respective holes (44). As can be seen from the relative orientation of each of the projections (54) and holes (44), when the platen (36) is rotated by approximately 24° then the outer peripheral shapes of the platen (36) and carrier plate (16) coincide and also the projections (54) are rotated about the boss (42) such that they are held within the holes (44) by way of the projection (50) acting as a detent and also the strip of material (48) of the carrier plate (16) between the holes (44) and (46) acting as a spring urging this detent into engagement with each projection (54). As can be seen in particular from Figure 3, each projection (54) has an overhanging hook (60) which further includes a portion (56) formed as a flat face. When the platen (36) and carrier plate (16) are rotated so as to be locked together as described above, this portion (56) lies flat against face (58) of the carrier plate (16). This is necessary so that the majority of the oscillating driving force is imparted to platen (36) by the carrier plate (16) through these flat and abutting faces (56), (58). The platen (36) is retained from separating and therefore falling off the carrier plate (16) by way of hook (60) shown in Figure 3 co-operating with the platform (52). As has been described above, the platform (52) is situated in a plane which is vertically displaced from the plane of the carrier plate (16) and standing proud thereof. The hook (60) therefore sits between the platform (52) and the plane of the carrier plate (16) and in this way the platform (52) acts as a vertical catch for the hook (60).

In order to prevent the tip portion of the platen (36) coming away from the carrier plate (16) the platen (36) carries a first ramp surface (62) as shown in Figure 3, which ramp surface (62) co-operates with a second ramp surface (64) in the carrier plate (16). It will be understood that the coupling mechanism between the first ramp surface (62) and second ramp surface (64) operates to engage the two surfaces, when the platen is rotated to engage the projection (54) and its hook (60).

As can also be seen from figures 2 and 3 a screw (not shown) aids securing the platen (36) to the carrier (16) in addition to the coupling mechanism described above. In particular, the screw serves primarily to prevent the platen (36) from rotating relative to carrier (16) during orbital motion. A boss (70) acts as a guide hole for the passage of the screw (not shown) through the platen (36). The screw then screws into the threaded blind hole (72) in the carrier (16) to secure the platen (36) to the carrier (16).

One more alternative platen (36) can be provided, for use in different sanding operations, such as for detail sanding, sanding louvres, where the platen is provided with a finger extension and contour sanding.